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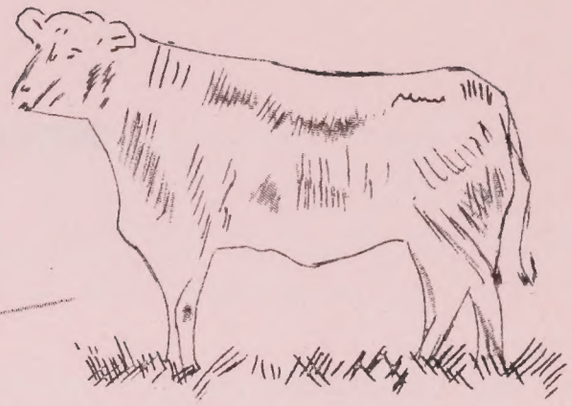


Field Day 1962

Program

2:00 **PM** Cutting Horse Competition,
directed by George G. Ross, Jr.

3:00 PM Research Reports

S. Smoliak - Native range, crested wheatgrass and Russian wild rye grass pastures; carrying capacity studies with sheep; use of commercial fertilizers; precipitation and forage yields; estimation of range forage utilization.

J.A. Vesely - Production performances of Rambouillet, Romnelet, Targhee, Columbia and Suffolk breeds on range and in feedlot; selection for post-weaning gain in Romnelet and Rambouillet sheep; heredity of certain anatomical characteristics of sheep's teeth and their relation to the production traits; lambing records.

J.E. Lawson - A comparison of Highland, Hereford and reciprocal cross cattle; selection for post-weaning gain in beef cattle, using high and low planes of nutrition.

H.F. Peters - Research with wide crosses in beef cattle: Cattalo; Brahman X British breeds.

4:30 **PM** Races: Children to adults.

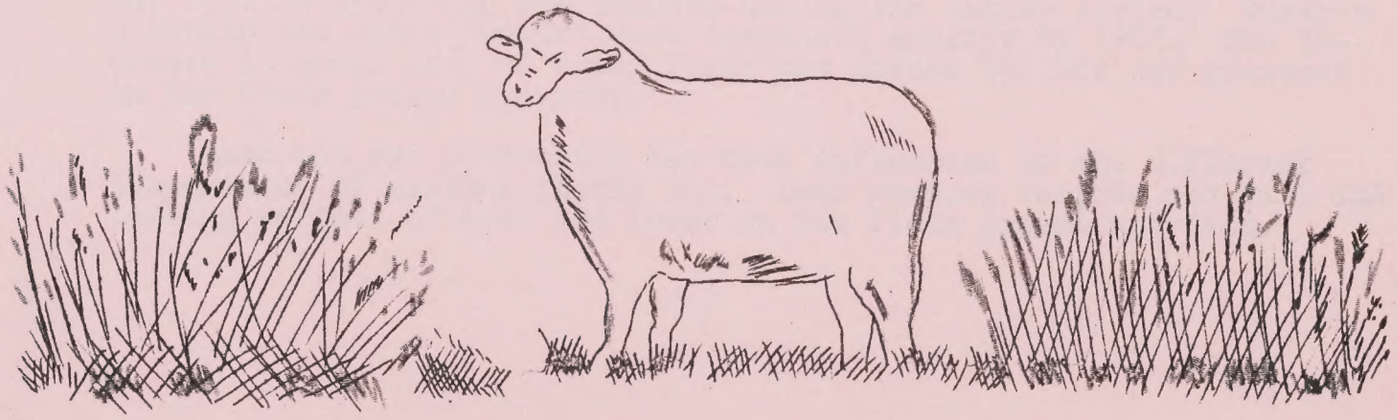
5:30 PM Meeting of Western Stock Growers' Association.

Speakers:

George G. Ross, Jr.,	President, W.S.G.A.
Eian Chisholm,	Secretary, W.S.G.A.
Fred Newcombe,	Assistant Secretary, W.S.G.A.
Bert Hargrave,	Director, W.S.G.A.
John Cross,	President, Western Section, Council of Canadian Beef Producers.

7:00 PM Barbecue.

9:00 PM Dance.



EXPERIMENTAL FARM
RESEARCH BRANCH, CANADA AGRICULTURE
MANYBERRIES, ALBERTA

1962 Field Day Report

Forage Crops

by S. Smoliak

Native range, crested wheatgrass and Russian wild rye grass pastures

Grazing trials with yearling ewes have been conducted over the past five years on native range, crested wheatgrass and Russian wild rye grass pastures. Native pastures were grazed at 2/3 acre per head per month, while the cultivated pastures were grazed twice as heavily in 1957 and 1958, four times as heavily in 1959 and 1960, and three times as heavily in 1961 and 1962. Three grazing systems were used: continuously grazing each pasture type during a 7-month grazing season, rotational use of the three pasture types, and a free-choice system of grazing.

Over a five-year period, gains per acre (Chart 1) on crested wheatgrass and Russian wild rye grass pastures were 2.7 and 3.6 times greater, respectively, than those on native range pastures. Gains per acre on the rotation and free-choice systems of grazing were 2.0 and 2.3 times greater, respectively, than on native pastures.

Estimated T. D. N. production per acre (Table 1a) of the reseeded grasses averaged 3 to 3½ times as much as on native range pastures. In the dry year of 1961, the reseeded grasses yielded 3 times as much T. D. N. as native ranges.

Yearling ewe gains during the spring grazing period (2 months) were similar on all treatments (Table 1b). Average gains per head during the mid-summer (2 months) were greatest on the native range, Russian wild rye grass and free-choice pastures. Gains per head during the fall period (3 months) were greatest on fields containing Russian wild rye grass. The grazing trial is being continued.

Carrying capacity studies with sheep

Analyses of the vegetation in fields grazed at three different intensities have shown that with continued heavy grazing the vegetative cover deteriorates. During a relatively moist period, 1951 to 1956, blue grama grass, speargrass and Junegrass increased in basal areas. Basal area of western wheatgrass decreased more on the field grazed heaviest. During the drier period, 1956 to 1962, blue grama grass, speargrass and western wheatgrass decreased in basal area. Low forage producers, Sandberg's bluegrass and the sedges, increased substantially on the fields grazed at 5/6 and 1 acre per head per month and remained the same or were reduced on the field grazed at 1¼ acres per head per month.

Fringed sage increased in basal area during the favoured period, 1951 to 1956, and was reduced during the latter period. Pursh's plantain and other "weeds" were increased greatly by 1962. The increase in basal area of total forbs and shrubs by 1962 was greatest in the field grazed heaviest.

Lamb and ewe production has been influenced by the different intensities of grazing (Table 2a). Lamb weaning weights and fall and lambing weights of ewes are lower on the field grazed heaviest.

Use of commercial fertilizers

Three areas, containing adjacent stands of native range and crested wheatgrass, were used to study the effects of nitrogen and phosphorus fertilization. The fields of native range, where sites 1, 2 and 3 were located, were used as winter and early spring pasture, summer pasture and spring pasture, respectively. Fields of crested wheatgrass, containing sites 1, 2 and 3, were established in 1936, 1934 and 1928, respectively.

Forage production of native range and crested wheatgrass was increased by the application of nitrogen fertilizer. Phosphate fertilizers did not increase forage production under our conditions (Table 3). The residual effect of nitrogen fertilizer was evident for three years after application on all but one crested wheatgrass site in 1961. These trials are being continued.

Precipitation and forage yields

Research work at Manyberries has indicated that 3.7 inches of precipitation during May and June are required to produce a crop of grass yielding 317 pounds per acre. Each additional inch of precipitation provides 78 pounds of forage. In 1961 our May and June precipitation totalled 2.05 inches, while in 1962 it was 5.53 inches.

Other factors, such as amount of carryover, snowfall, rainfall distribution, etc., may also have an influence upon forage production.

Estimation of range forage utilization

A technique to measure utilization of forage in the "shortgrass" area has been developed. The procedure is to measure 20 mature speargrass (Stipa comata) plants at regular intervals along a straight line and record stubble height, or ungrazed leaf height, to the nearest one-half inch. This procedure is repeated on 10 or more sites representative of the field to be sampled. The stubble heights recorded are then converted to per cent use by reference to the table below. The average utilization values obtained at each site are totalled and averaged to yield the utilization percentage of the field sampled.

Stubble height in inches	Per cent use of Stipa comata
1.0	99.8
1.5	80.5
2.0	63.9
2.5	50.0
3.0	38.4
3.5	28.9
4.0	21.4
4.5	15.5
5.0	11.1
5.5	7.9
6.0	5.7
6.5	4.3
7.0	3.4
7.5	2.9
8.0	2.5
8.5	1.9
9.0	1.0
9.5	0.0

Table 1. Gains per acre of yearling ewes on various treatments during a 7-month grazing season, 1957 to 1961, inclusive.

Table 1a. Estimated total digestible nutrients (T.D.N.) consumed, remaining as carryover and total production per acre on native range, crested wheatgrass and Russian wild rye grass pastures. 1957 to 1961, inclusive.

Year	Pasture	Pounds T.D.N. per acre*		
		Consumed	Carryover	Total
1957	Native	69	74	143
	Crested wheatgrass	144	340	484
	Russian wild rye	150	302	452
1958	Native	79	75	154
	Crested wheatgrass	148	351	499
	Russian wild rye	164	294	458
1959	Native	73	72	145
	Crested wheatgrass	292	258	550
	Russian wild rye	313	178	491
1960	Native	78	70	148
	Crested wheatgrass	280	124	404
	Russian wild rye	328	137	465
1961	Native	79	30	109
	Crested wheatgrass	245	51	296
	Russian wild rye	258	44	302

* Calculated from animal gains and amount of carryover by the technique of Sylvestre and Williams. T.D.N. in mature forage was estimated at 50 per cent.

Table 1b. Seasonal and total liveweight gains of yearling ewes on the various treatments. Average of 5 years, 1957 to 1961.

Pasture	Average gain in pounds			
	Spring	Summer	Fall	Total
Native range	21.3	13.5	1.6	36.4
Crested wheatgrass	23.4	9.4	-1.2	31.6
Russian wild rye grass	21.6	13.6	6.7	41.9
CWG-Native-RWR - Rotation	21.7	8.8	6.5	37.0
CWG-Native-RWR - Free-choice	23.5	12.5	5.6	41.6

Table 2. Basal area, proportion of ground surface occupied by a species, in 1951, 1956 and 1962 on fields grazed at 5/6, 1 and 1¼ acres per head per month by mature ewes and lambs.

SPECIES	5/6 acre			1 acre			1¼ acres		
	1951	1956	1962	1951	1956	1962	1951	1956	1962
Blue grama grass	2.16	3.12	2.40	3.19	3.45	2.02	2.83	3.38	2.05
Speargrass	0.50	1.33	0.26	0.71	1.48	0.43	0.38	1.24	0.95
Junegrass	0.12	0.78	0.17	0.26	0.86	0.31	0.26	0.69	0.40
Western wheat-grass	1.85	1.40	0.68	1.79	1.48	0.84	1.71	1.67	0.88
Sandberg's blue grass	0.24	0.50	1.73	0.47	0.31	1.30	0.38	0.78	0.78
Other grasses	0.12	0.54	0.07	0.16	0.52	0.22	0.05	0.20	0.22
Sedges	1.07	0.94	1.88	0.85	0.90	1.50	1.10	2.26	1.12
Total grasses and sedges	6.06	8.61	7.19	7.43	9.00	6.62	6.71	10.22	6.40
Fringed sage	0.05	0.33	0.12	0.05	0.83	0.12	0.21	1.14	0.10
Winterfat	0.02	0.05	0.10	0.02	0.05	0.10	0.07	0.55	0.24
Pursh's plantain	0.14	0.35	1.90	0.10	0.19	1.62	0.36	0.00	1.69
Others	0.33	0.98	2.91	0.47	1.32	2.02	0.19	0.68	0.86
Total forbs and shrubs	0.54	1.71	5.03	0.64	2.39	3.86	0.83	2.37	2.89
Club moss	12.97	30.30	18.86	9.24	19.67	17.26	6.21	15.31	16.07

Table 2a. Ewe and lamb production on fields grazed at 5/6, 1 and 1¼ acres per head per month. 1961-1962.

		5/6 acres	1 acre	1¼ acres
Lamb weaning wt.	1961* (lb.)	77.4	86.0	83.9
Ewe Nov. 1 wt.	1961 (lb.)	127.0	132.9	136.0
Ewe lambing wt.	1962 (lb.)	128.7	136.0	142.1

* Adjusted for age and sex and state of rearing

Table 3. Dry matter yields in pounds per acre from various applications of fertilizers. The data are averaged from 3 sites, each with 4 replicates.

Years fertilized and clipped	Pounds of nitrogen and phosphorus per acre				
	Check	30 N	60 N	30 P	60 P
			Native range		
1958 treatments					
1959 yields	88	152	198	84	84
1960 yields	64	142	257	64	68
1961 yields	18	36	30	18	20
1959 treatments					
1960 yields	75	181	236	70	90
1961 yields	22	38	40	23	23
1960 treatments					
1961 yields	34	42	45	35	31
			Crested wheatgrass		
1958 treatments					
1959 yields	403	613	763	373	380
1960 yields	281	378	492	273	261
1961 yields	58	64	72	52	57
1959 treatments					
1960 yields	268	899	1140	313	280
1961 yields	56	64	55	63	54
1960 treatments					
1961 yields	77	113	130	62	69

Sheep Breeding

J. A. Vesely

Production Performances of Rambouillet, Romnelet, Targhee, Columbia, and Suffolk Breeds on Range and in Feedlot

Complete sets of data of 1960 and 1961 are available at this time. No detailed analysis has been performed and only general comparative results can be presented.

Feeder lambs. - Unadjusted average weaning weights of all five breeds are listed in Table I.

Table I. Average weaning weights (lbs) of five breeds of sheep in 1960 and 1961.

	Suffolk		Rambouillet		Romnelet		Targhee		Columbia	
	1960	1961	1960	1961	1960	1961	1960	1961	1960	1961
Male singles	74.7	80.2	82.5	81.6	74.5	82.6	78.8	81.5	73.3	71.5
Male twins*	66.6	69.4	61.9	61.1	56.8	58.3	63.5	62.6	63.9	62.3
Female singles	84.3	90.0	81.2	81.2	72.9	77.5	74.2	80.6	80.4	68.0
Female twins*	62.1	67.5	59.0	62.6	58.3	64.4	67.0	58.9	58.8	65.7
Average	71.9	76.8	71.1	71.6	65.6	70.7	70.8	70.9	69.1	66.8
Average for 1960 and 1961	74.3		71.3		68.1		70.8		67.9	

*Twins raised singly not included.

Lambing percentage within breeds differed considerably between the two years. In 1960, the percentage of lambs weaned per ewe bred was: in Suffolk, 152; in Rambouillet, 120; in Romnelet, 118; in Columbia, 109; and in Targhee, 95. In 1961 the percentages were 150, 130, 125, 117 and 110 percent for Columbia, Targhee, Rambouillet, Suffolk and Romnelet, respectively. The average number of pounds of lamb weaned per ewe bred for the two years was: Suffolk, 91.6 lbs; Columbia 87.1 lbs.; Rambouillet, 83.7 lbs.; Targhee, 79.9 lbs.; and Romnelet, 75.6 lbs.

On July 1st this year, the percentage of lambs per ewe bred was: in Romnelet, 140; in Targhee, 140; in Suffolk, 135; in Columbia, 127; and in Rambouillet, 112. The number of pounds of lamb per ewe bred was: Suffolk, 76.6 lbs.; Romnelet, 74.2 lbs.; Targhee, 71.5 lbs.; Columbia, 67.1 lbs.; and Rambouillet, 60.5 lbs. The average lamb's body weights of July 1st, 1962 are shown in Table II.

Table II. Average body weights (lbs.) of lambs, July 1st, 1962.

	Suffolk	Rambouillet	Romnelet	Targhee	Columbia
Male singles	48.5	63.0	60.1	58.4	59.6
Male twins*	56.4	48.6	49.8	47.2	49.5
Female singles	68.0	56.8	60.7	58.1	61.7
Female twins*	53.2	51.2	48.4	46.3	44.9
Average	56.5	54.9	54.7	52.5	53.9

*Twins raised singly not included.

Wool production. - In the class of mature ewes, Columbias excel in wool production (2-year average, 11.9 lbs.). Rambouillet (10.9 lbs.) and Targhee (108 lbs.) have about equal performance, although Targhees' Staple is longer. Romnelet wool clips rank fourth in weight (9.6 lbs.), but in grade and staple length they are equal to those of Columbia. Suffolks produce the least wool (6.6 lbs.). In clean fleece production, Columbias are first (6.2 lbs.), followed by Romnelets (5.5 lbs.), Rambouillets (5.5 lbs.), Targhees (5.5 lbs.) and Suffolks (3.6 lbs.).

Feedlot and carcass traits. - Average feedlot gains over a 75-day period were 37.0 lbs, 36.0 lbs, 34.0 lbs, 27.8 lbs and 25.7 lbs for Targhee, Suffolk, Columbia, Rambouillet and Romnelet, respectively. There were no breed differences in average carcass grades. Carcass traits to be analysed include weights and measurements of various meat cuts, the ratio of lean to fat in the loin, areas of loin eye, tenderness values of loin, shoulder and leg, and interrelations of carcass measurements, separable fat, lean meat and bone-ligament contents.

Creep feeding on range. - There was no significant advantage in creep feeding of lambs on range in the summers of 1960 and 1961.

Selection for post-weaning gain in Romnelet and Rambouillet sheep

One hundred fifty Romnelet and 150 Rambouillet ewes will be maintained for three generations. All rams and replacement ewes will be selected for post-weaning gain only. The effectiveness of selection for post-weaning gain and the correlated response of all other production traits will be measured. The effects of inbreeding on performance in production traits will be determined.

Demonstration I. Romnelet rams.

Brand red	Brand blue	Ear tag	Weaning Wt.(lbs) Aug. 30, 1961	Post-weaning gain, 126-day test (lbs) total	Post-weaning gain, 126-day test (lbs) daily	Final weight (lbs)	May 16, 1962 body wt.(lbs)	Yearling fleece weight (lbs)	Birth type
	1	215S	92	71	.56	163	176	14.2	S
	2	229S	72	73	.58	145	142	12.8	T
	3	173S	67	73	.58	140	121	9.1	T
	4	69S	70	73	.58	143	145	13.3	T
	5	65S	95	72	.57	167	159	13.6	S
1		15S	81	61	.48	142	164	11.6	T
2		71S	93	60	.48	153	172	11.5	S
3		109S	88	58	.46	146	160	11.4	S
4		131S	80	48	.38	128	160	11.6	T
5		147S	98	62	.49	160	164	13.3	S

90 Romnelet rams
Average weaning wt. 73 lbs.
Average total gain 56 lbs. - daily gain 0.45
Average final weight 130 lbs.

Demonstration II. Rambouillet rams

Brand red	Brand blue	Ear tag	Weaning Wt.(lbs) Aug. 30, 1961	Post-wean gain, 126-day test (lbs) total	Post-wean gain, 126-day test (lbs) daily	Final weight (lbs)	May 16, 1962 body wt.(lbs)	Yearling fleece weight (lbs)	Birth type
	1	223S	70	88	.70	158	172	10.7	Tr
	2	215S	66	78	.62	144	147	10.5	T
	3	195S	66	78	.62	144	154	10.0	T
	4	147S	55	76	.60	131	134	8.5	Tr
	5	139S	74	72	.57	146	153	10.4	T
1		39S	103	58	.46	161	178	13.4	S
2		99S	99	68	.54	167	171	10.6	S
3		163S	85	65	.51	150	170	10.5	S
4		127S	81	54	.43	135	167	8.6	T
5		61S	91	55	.44	146	168	9.5	S

76 Rambouillet rams
Average weaning weight 77 lbs.
Average total gain 61.3 lbs. - daily gain 0.49
Average final weight 138 lbs.

Heredity of certain anatomical characteristics of sheep's teeth and their relation to the production traits.

Objectives. - The main objectives of this work are to determine the heritability of certain anatomical characteristics of sheep's front teeth, to find the correlation of the anatomical characteristics with the duration of the deutition, to find the correlation of anatomical defects with the performance of lambs in the feedlot and on the range and to determine the effect of condition of teeth on productivity of the ewe.

This work will begin in August, 1962.

Lambing records.

Evaluation of milk supply of ewes at lambing. - During the last thirteen years each ewe has been scored for milking ability within 24 hours after lambing. The ewes have been classed into the categories of good, fair or poor milkers, based on estimates from stripping and palpation, and scored as 1, 2, 3, respectively. Scores obtained from 999 ewes of 1949-1958 were correlated with corrected weaning weights of lambs born in the year when the score was taken. All weaning weights were corrected for effects of year, type of birth and rearing, age of dam and age of lamb. The intra-sire correlation coefficient, though statistically significant, was very low (-0.09). This indicates that the evaluation of ewe's milking ability within 24 hours after lambing, at least by this technique, is highly inadequate.

Standards for measuring hairiness of the lamb's tail at docking as a mean of predicting grade of wool at the time of first shearing. - Tails of 340 lambs born in the same year were scored for the amount of coarse hair. The standards for measuring hairiness of lambs' tails at docking were as follows:

grade 1. Only trace of hair found at tip of tail.
grade 2. Coarse hair extends only a short way up tail, good wool fibres found over most of tail.
grade 3. Coarse hair extends half way up and good wool fibres are found at the base of the tail.
grade 4. Mostly all coarse hair with few good wool fibres towards base of tail.
grade 5. Coarse hair extends to base of tail.

The intra-breed, intra-sex correlation coefficient between the scores of tails and the wool grades at the age of one year was + 0.12. This correlation coefficient was significant at the 5 percent probability level.

Mastitis in sheep. - There are several types of mastitis in domestic animals. They may be defined as acute, sub-acute, or chronic inflammations of a mammary gland. The disease is contagious, caused by various kinds of micro-organism. Quite often, an injury of a teat or an udder gives the microbes a chance to enter the organ. They attack either the secreting cells or the fibrous tissue and sometimes cause abcesses in a form of lumps in the udder. The nodules are quite apparent in ewes at weaning time. Some sheepmen call such females as mastitic. An investigation was designed and commenced in 1960 to find out if these lumps are carriers of mastitis and if they cause any reduction in milk production and longevity of the ewe and an increase of mortality in the lambs.

Each ewe's milk was tested for mastitis in 1960 and 1961. The "California mastitis test", recently developed, was used. Also, each ewe's udder was scored in the fall for size, shape and condition, including the stage of drying-out, location and number of lumps, if any, present. At this time it is impossible to draw any conclusion due to a small number of observations. The following information can be given from data collected up to date.

(a) 791 ewes have been tested for mastitis.
(b) 101 ewes (12.7 per cent) have been found positive.
(c) 851 ewes have been scored at weaning.
(d) 65 ewes (7.7 per cent) have been found to have nodules in one or both halves of the udder.
(e) 12 ewes were either culled for mastitis or died of mastitis but only one of them was positive at lambing.
(f) 67 ewes were positive in the right half of the udder but only 5 of them had nodules in the right half. Fifty ewes were positive in the left half but only 4 of them had nodules in the left half.
(g) Only 4 ewes had nodules in both years.

A Comparison of Highland, Hereford and Reciprocal Cross Cattle

J. E. Lawson

The objective was to determine how Highland and first-cross Highland-Hereford cattle would compare with Herefords in hardiness and productivity under range conditions.

Hereford calves were heavier than Highland calves by seven pounds at birth but gained to weaning at the same rate. Crossbred calves were similar to Hereford calves in birth weight but outgained them 1/8 of a pound per day from birth to weaning.

In the feedlot, Hereford steers outgained the Highland by ¼ of a pound per day. In weight-per-day-of-age from birth to the end of the feedlot period the Hereford steers outgained the Highland by 1/5 of a pound per day. There was no difference between crossbred and Hereford steer calves in either feedlot gain or weight-per-day-of-age from birth to the end of the feedlot period. Similarly, there was no difference between Hereford and crossbred heifers in weight per day of age from birth to 18 months of age, but Herefords exceeded Highlands by 1/8 of a pound per day.

Hereford steers were superior to the Highland in efficiency of feed utilization in the feedlot, dressing percentage (about 2%) and carcass grade. There was no difference between Hereford and crossbred steers in any of those traits. No differences were apparent among breeds in muscle fibre thickness or the percentage of fat interspersed in the muscling. When carcasses of the same size were compared, Highland and crossbred steers exceeded the Hereford in rib-eye area.

Hair samples were taken from all feedlot steers. There was no difference among breeds in the number of hair fibres per square inch. Highland and crossbred steers exceeded the Hereford in hair fibre length, hair fibre thickness and hair sample weight. Animals possessing these outstanding hair characteristics, however, showed no benefit of additional hardiness measured in terms of increased feedlot gain or improved efficiency of feed utilization.

The amount by which Hereford cows exceeded Highland cows in weight at weaning increased from 168 pounds at two years of age to 285 pounds in the age group eight years and over. Limited data on the crossbred cows indicates that their weights will fall intermediate between those of the parent breeds.

Following an annual six week breeding season Hereford and crossbred cows have averaged a 90% calf crop while Highland cows have averaged 65%. Highland, Hereford and crossbred heifers produced in the four calf crops from 1957-1960 have been retained and observations on heat interval, gestation length, and time from calving to first heat made. Failure of the Highlands to come into heat as quickly following calving may partially account for their lower calf crop at this location. An extension of the breeding season would solve the problem.

Highland, Hereford and crossbred cows raising calves are being milked periodically and along with a record of the weight of milk, determinations are being made of the percent fat, percent solids-not-fat and percent protein. The cows are being bred to either Hereford or Angus bulls. Complete feedlot and carcass data will be obtained on all of the calves produced.

Selection for Post-Weaning Gain in Beef Cattle Using High and Low Planes of Nutrition

J. E. Lawson

Performance testing has been recognized as a selection tool of tremendous potential. Many factors may influence the efficiency and effectiveness of a testing program, however, the traits used in selection, the emphasis placed on each trait, the method of measurement, the feedlot ration, and others. Emphasis should first be placed on traits which have the greatest economic importance, can readily be passed on from parent to offspring and preferably, are easily measured.

Research related to these points will be conducted on herds of 216 registered Hereford and 216 registered Aberdeen Angus cows. It is expected that all of the foundation stock will be assembled by the fall of 1962.

The females of each breed will be divided into two lines of 108 cows each, made up of equal numbers of each age group from 2 to 7 years. All four lines will be closed to outside breeding and all replacements will be selected for use in the lines in which they were produced.

All calves weaned on the project will be subjected to a feedlot performance test in which two different planes of nutrition will be used. A High Plane ration which is intended to promote a rapid growth rate, and which will be fed to one line of each breed, will consist of two parts rolled grain to one part chopped hay, by weight. A Low Plane ration which is intended to promote a slow growth rate and which will be fed to the second line of each breed, will consist entirely of chopped hay.

In all lines, the only basis for selection will be superior gain in the 168 day feedlot period immediately following weaning. Post-weaning gain is one of the few traits which fills all of the ideals listed above.

A number of other records will be taken, some of which are birth date, birth weight, weaning weight, visual conformation and condition scores, body measurements and bull fertility tests. None of these traits will be used in selection. They will, however, serve to measure the effect on the performance of the lines as a result of selection based entirely on post-weaning gain obtained under each of two feeding regimes.

Progress will be observed on a year by year basis. As a further test of progress, however, semen samples will be collected from all foundation sires and from all of the bulls produced in the eighth calf crop. These bulls will be bred artificially to a large group of commercial cows. The resulting progeny will be tested primarily for efficiency of feed utilization, feedlot gain and carcass quality. The results of these tests, comparing at one time the progeny of foundation sires with the progeny of sires produced some years later will give a good estimate of total progress made from the beginning of the project.

The objectives of the project are not restricted to obtaining the ideal or improving already good qualities. The kind and degree of improvement or deterioration which may arise from our methods of treatment are equally important from the standpoint of providing knowledge as a guide for future planning.

In a preliminary test, using the High and Low Plane rations, bull calves were feedlot tested for 168 days. The High Plane ration produced an average gain of 2.1 pounds per day, while the Low Plane ration produced an average gain of 1.1 pounds per day. Animals on the High Plane ration gained 1/3 of a pound per day more when group fed than when individually fed. Similarly, animals on the Low Plane ration gained 1/5 of a pound per day more when group fed than when individually fed.

Research with Wide Crosses in Beef Cattle

H. F. Peters

Cattalo

This is a breed development project. The aim is to combine the cold tolerance of the American bison with the economic traits of domestic beef cattle.

Published work has shown that domestic x bison hybrids and ¼ -bison Cattalo are especially winter hardy, as evidenced by ability to withstand severe cold with minimal feeding and to graze on upland winter range in cold weather.

The major problem in this project has been sterility of Cattalo bulls. No fertile first-cross bulls were obtained and it was necessary to back-cross to one of the parent species to obtain fertility. Successive back-crosses to domestic cattle were made, so that the present Cattalo contain about 16 per cent bison breeding.

In some of the bulls, no spermatozoa are produced. Semen density in the others ranges from very few spermatozoa to normal concentration. The percentage of yearling bulls with good sperm concentration has increased from about 9 per cent in 1955 to 27 per cent in 1962.

Selection of breeding stock is based primarily on fertility, weaning weight and gain on post-weaning performance test. The Cattalo are similar to the Herefords in weaning weight, but they have a slightly lower rate of gain in the feedlot (Table 1).

Table 1. Performance of Cattalo and control Hereford calves weaned on November 1, 1961.

	Bull calves		Heifer calves		Sexes combined	
	Cattalo	Hereford	Cattalo	Hereford	Cattalo	Hereford
No. weaned	28	16	28	12		
No. finishing 224 day rate-of-gain test	26	16	28	11		
Weaning wt., lb.*						
Average	396	402	396	372	396	387
Range	282-464	296-464	260-498	276-430		
Daily gain on test, lb.						
Average	2.22	2.45	1.79	1.84	2.00	2.14
Range	0.99 - 3.01	1.96 - 2.73	1.23 - 2.26	1.33 - 2.06		

* Adjusted to a constant age-of-dam basis.

Comparative carcass studies of Cattalo and Hereford yearling bulls in 1962 showed no breed differences in cross-sectional area of ribeye muscle (longissimus dorsi), tenderness of broiled meat samples, or proportion of carcass in the primal cuts (rib, loin, rump and round).

Although the Cattalo have thicker hair coats than Hereford cattle, as measured by hair weight and number of fibers per unit of skin area, correlation studies have shown that the cattle with the best performance in these breeds do not necessarily have the thickest hair coats. At present, it appears that the best means of fostering extreme cold tolerance in a breed of beef cattle would be to select for high performance in a rigorous environment, either by use of controlled-temperature facilities or by choosing for performance testing a location where sub-zero mean temperatures prevail during the winter months.

Brahman X British Breeds

Birth weight. - Brahman X Hereford, Brahman X Angus and Brahman X Shorthorn calves averaged 5 to 8 pounds heavier than control grade Herefords over a five-year period (1951 to 1955). Hereford-sired calves out of the crossbred cows were 5 to 9 pounds lighter than Herefords at birth. Hereford-sired calves out of ¼-Brahman cows did not differ significantly from Herefords in birth weight.

It was noted that none of the first-cross cows required assistance at calving, either at two years of age or at any later calving, and this may have been due in part to the low birth weights of their calves. Many of the Hereford heifers required assistance in calving at two years of age.

Weaning weight. - Weaning weights were adjusted to a constant age of calf, age of dam, sex and year of birth basis in determining the breed differences (Table 2). All part-Brahman groups were heavier than the control Herefords at weaning, but the heaviest calves were those out of the first-cross cows.

Table 2. Average weaning weights of calves in a three-generation cross-breeding and back-crossing experiment, 1951 to 1959.

Breed of sire	Breed of dam	Number weaned	Average weaning weight, lb.
H	B X S	32	429
H	B X A	36	420
H	B X H	51	405
H	H X (BXS)	21	405
H	H X (BXA)	20	396
B	A	39	375
B	S	33	372
H	H X (BXH)	34	368
B	H	63	351
H	H	221	329

H = Hereford, B = Brahman, A = Angus and S = Shorthorn.

Post-weaning gain. - First-cross Brahman hybrids outgained Herefords by a significant margin up to 2½ years of age. The backcross Hereford X (Brahman X Hereford) cattle gained slightly less than Herefords, whereas the three-breed-cross cattle, Hereford X (Brahman X Angus) and Hereford X (Brahman X Shorthorn), gained slightly more than Herefords on the range from weaning to 18 months of age.

Although Hereford X (Brahman X Hereford) cattle gained less than Herefords in the feedlot, they maintained a substantial advantage in weight up to the time of slaughter.

Carcass traits. - First-cross steers carried more finish than Herefords when marketed off-grass at 2½ years of age, graded higher, dressed 3 to 4 per cent higher, and had larger areas of ribeye muscle. Quarter-Brahman cattle marketed as fed calves did not differ consistently from Herefords in carcass grade or dressing percentage, but they were superior in area of ribeye muscle. The Herefords were slightly superior in tenderness of meat.

Milk production. - Eighteen-hour milk yields* following intra-venous injections of the milk let-down hormone, oxytocin, were obtained from Brahman X Hereford and Hereford cows at five dates during the summer of 1961. Average milk yields were 10.2 and 8.8 pounds for the crossbreds and Herefords, respectively. Milk yields reached a peak in June, then declined progressively until October, following closely the trend that occurs in protein content of range forage. Cows gained weight and calves continued to gain at a rate of about 2 pounds per day until early September. After that date, both groups of cows lost weight and gains of calves were reduced. Daily gains averaged 0.93 and 0.14 pounds for the ¼-Brahman and Hereford calves, respectively, the last 14 days of October.

Limited data obtained in this experiment and elsewhere indicate that the milk of Brahman crossbred cows has a higher butterfat percentage than that of the domestic beef breeds.

Conclusion. - The results of this experiment showed that the first-cross hybrids were superior to either the ¼-Brahman or the Hereford in growth rate and maternal ability. This is to be expected because of the greater genetic diversity between their parents. It is apparent that constructive breeding work is warranted in order to make use of the hybrid vigor that can be obtained through the crossing of Brahmans with breeds of European origin.

*Cows were milked out at night and separated from their calves for 18 hours; 18-hour yields are totals of 12-hour AM and 6-hour noon milkings.